

ABSTRACT

A method to enhance grain size in polysilicon films while avoiding formation of hemispherical grains (HSG) is disclosed. The method begins by depositing a first amorphous silicon film, then depositing silicon nuclei, which will act as nucleation sites, on the amorphous film. After deposition of silicon nuclei, crystallization, and specifically HSG, is prevented by lowering temperature and/or raising pressure. Next a second amorphous silicon layer is deposited over the first layer and the nuclei. Finally an anneal is performed to induce crystallization from the embedded nuclei. Thus grains are formed from the silicon bulk, rather than from the surface, HSG is avoided, and a smooth polysilicon film with enhanced grain size is produced.